CONTENTS

CHAPTERS

APPENDICES

I. AN OVERVIEW OF THE ATRT 1700

The ATRT-1700 Automated Traffic Recorder Tester (1700) provides a sequence of test inputs to an Automated Traffic Recorder (ATR). The 1700 simulates a set of field inputs that the ATR might be subject to in an actual field installation. The tester provides an accurate record of the census of vehicles that were simulated to the inputs of the ATR, and this record is compared to the report created by the ATR to determine the accuracy of the ATR under test. The term "ATR" is used to describe a piece of equipment which may also be known as a Traffic Counter, Counter/Classifier, Traffic Data Recorders, or Traffic Monitoring Device. For brevity, the term ATR will be used throughout this manual.

The ATR is used extensively to gather highway usage data for allocation of highway maintenance resources. Like a census-taker, the ATR reports count and classification data for vehicular traffic passing the installation location. The aggregated data base of these usage factors over the years allows various types of analysis, such as a statewide snapshot of highway usage at any point in time, or longitudinal usage profiles over a selected span of years for any specified region or roadway. The results, in turn, are used in allocating resources for maintenance to highways throughout the state.

Figure 1 Setup of the ATRT 1700 with a Peek ADR-2000

The 1700 generates "signatures" of vehicles by creating a pattern of outputs which appear to the ATR under test just as a vehicle would in a field installation. The signatures are designed to simulate various vehicles passing over a set of roadway sensors as defined by the operator during the test setup. The 1700 software includes a set of vehicle signature files (signatures) that correspond to the 13 vehicle types established in FHWA Scheme F. In addition, the user may design their own vehicle signatures with up to 20 axles and any practical axle spacing. The user may select any combination from the set of standard and custom signatures during test setup.

The signatures are modified by the spacing and layout of the sensor array specified by the user during test setup. Nine sensor arrangements are available for one, two, or three sensors per lane. Up to 8 separate lanes can be simulated simultaeously, depending on the sensor array specified. The 1700 has 4 Road Tube, 8 Piezo, 8 Inductive Loop, and 8 Contact Closure outputs.

The signatures are further modified by the simulated speed of the vehicle. During setup the user can specify up to 16 speed bins that the signatures will be recorded in. The tester will output the signatures at speeds that fit into these pre-defined ranges so that the ATR report will match the 1700 report.

The 1700 is driven by a Personal Computer (PC) using the Microsoft Windows 95 operating system. The PC serves as the operator interface, data storage system, and runs the control program. The setup of the 1700 is greatly simplified by the use of a logical sequence of option selection menus and screens, which eliminates the need to memorize software commands.

The operator defines the test setup (speed bins, lanes, intervals, etc.), specifies the spacing and layout of the sensor array to be used by the tester, and fills in the test report header using the PC keyboard. The computer creates the signature timing and directs the output to the sensor simulators (in the tester) per the setup.

The operator must then configure the ATR in harmony with the tester setup to properly categorize the signatures sent by the 1700 to the ATR. The specified 1700 sensor outputs are then connected to the ATR inputs, and the testing is started from the PC keyboard.

The test session stops after the time established by the operator during setup has elapsed. This could be as little as 4 minutes up to as much as 4 days, or practically any amount of time in between, based on the purpose of the testing and the needs of the user. When the test is complete, the record of the volume, speeds, and classifications of signatures sent to the ATR are automatically stored on a disk file in the PC driving the 1700.

The operator then retrieves the record of vehicles counted by the ATR (using the same PC if desired) and stores this file also. The two files may now be compared to determine the accuracy of the ATR which was tested, manually or automatically. Automatic file comparison is available via optional AutoComparison software modules. Manual comparison is performed by the operator.

Highway usage statistics are vitally important for reclaiming Federal tax monies for maintenance and improvement projects. ATR's are the primary instrument used to collect the basic data for these purposes. It is evident that the costs to an agency of inaccurate traffic data could be significant. This is especially true because when an ATR fails, it is most often recording fewer vehicles than are present, which could result in a lesser justification than is actually appropriate. An effective method of verifying the accuracy of these traffic recorders is now available with the 1700, developed by ATSI.

ROADWAY SENSOR SIMULATORS

The loop simulator inductance is similar to a field installation of 3 turns of wire in a 6' x 6' rectangular loop with AWG 14 wire. The inductance is for the loop turns alone is 74 micro-Henries. An additional 30 to 150 micro Henries comes from a typical lead-in cable. For the typical ATR, the standard loop detectors can tune into the loop in the range of 50 to 350 micro Henries. Based upon the above described loop used in ATR installations and the typical loop detector's inductance range, a simulated loop with a base inductance between 120-150 micro-Henries was selected for use in the 1700.

The road tube simulator was designed and built to generate controlled air pressure transients to simulate the pressure wave produced by the vehicle passing over a road tube. A rubber hose is used to deliver the air pressure transient to the air switch input of the ATR.

In addition to the road tube, two other axle sensor inputs are commonly used: piezoelectric and tape switch sensors. Tester outputs to simulate these sensor types were designed and implemented. The tape switch and piezo simulations consist of step changes in resistance and/or voltage levels matched in time duration and magnitude to the roadway sensor outputs observed in the field trials.

II. INSTALLING THE ATRT SOFTWARE

To install the ATRT 1700 software, place disk #1 into the "A" drive and then choose Run from the Start Menu. Type: *A:\setup* and click the OK button. A series of screens will then guide you through the remainder of the setup. Have disk #2 ready when prompted by the computer.

III. A CLOSER LOOK AT THE ATRT SOFTWARE

Now that the software has been installed, you are now ready to begin testing your classifiers. After installation is complete, double-click the ATRT-1700 icon on the desktop to start the software. However, before you begin testing, let's take a closer look at each tabbed notebook page of the ATRT software. **NOTE**: If there is a communictions problem between the classifier and the ATRT, a communications error appears prompting the user to *ABORT*, *RETRY*, or *IGNORE*. Follow the error message instructions to proceed.

The software is designed so most of the test setup will be completed on the first two pages, Sensor Setup and Test Setup. The remaining pages are used for initial setup and occasionally modified, but for the most part are seldom used.

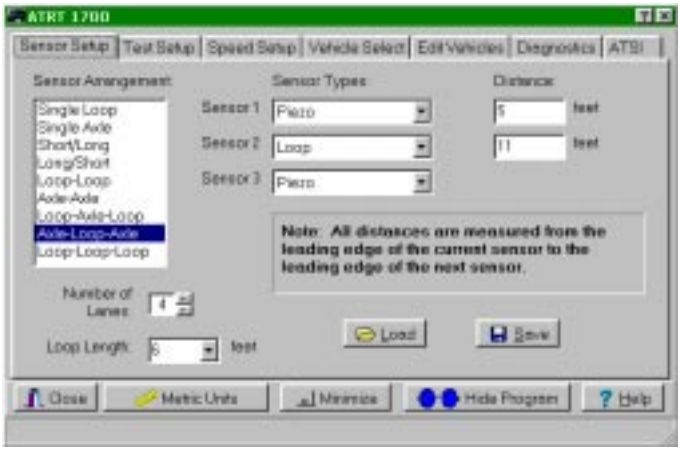


Figure 2 Sensor Setup screen

A. SENSOR SETUP

The **Sensor Setup** page shown to the right in Figure 2 will be the first page to appear. Here the "field setup" is recreated for the classifier to be tested. The software allows the setup(s) to be named and saved so the setup(s) can be quickly loaded for future testing.

The first choice to be made on this page is the *SENSOR ARRANGEMENT*. This list box lets the user select how the pavement sensors are arranged. Select the arrangement first then specify the types of sensors used in the Sensor Type boxes. For a closer look at each individual Sensor Arrangement, refer to the online Help section located within the software.

With the Sensor Arrangement now chosen, the software will automatically enable *SENSOR TYPES, DISTANCE, NUMBER OF LANES, and/or LOOP LENGTH* where appropriate. Fill in the information to match your field setup and the Sensor Setup page is now complete. This setup can now be saved by clicking the *SAVE* button and giving the setup an easily identifiable name. Saving each Sensor Setup will simplify testing by allowing the user to quickly *LOAD* the setup again for future testing.

NOTE: Choosing the save option on the Sensor Setup page will only save the information on this page and will not affect information on any other pages.

B. TEST SETUP

Next is the **TEST SETUP** page. This page allows the user to choose the type of test to run. There are two methods used to determine when a test ends: *SET NUMBER OF VEHICLES* (see Figure 3) and *INTERVAL TEST* (see Figure 4). As implied by the description, the *SET NUMBER OF VEHICLES* method allows the user to use a set number of vehicles for the test. The specific number is the number of times each selected vehicle is sent to the classifier for each speed bin selected. Once each vehicle has been sent to the classifier at a speed within each speed bin the test automatically finishes. The *INTERVAL TEST* method allows selection of the duration of the test. This is accomplished by selecting the number of intervals then choosing the specific interval period.

Set Number of Vehicles

This method requires the user to choose the number of vehicles to be included within the test as well as the minimum time between the vehicles.

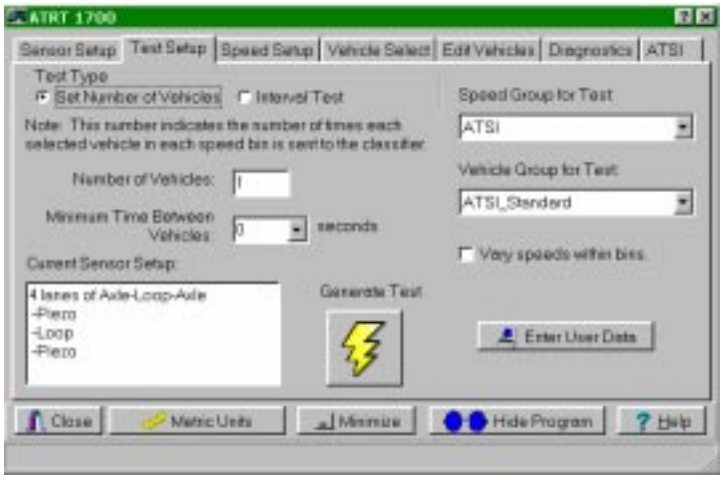


Figure 3 Set Number of Vehicles method

Interval Test

This method allows selection of the duration of the test. This is accomplished by selecting the number of intervals then choosing the specific interval period. An interval is simply the number of periods the test will run. The interval period is the length of time each test interval will last (in minutes). Only predefined interval periods may be used; clicking on the drop down arrow will list all possible values. **Note**: *there is a 25 second break between intervals.*

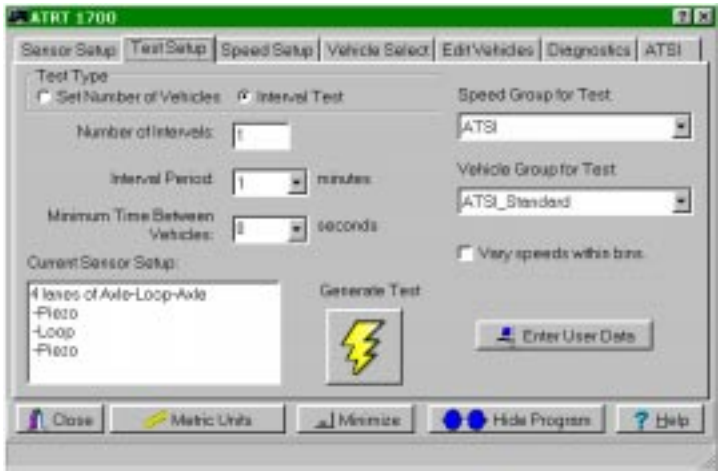


Figure 4 Interval Test method

After choosing the *Test Type*, the user then chooses the *SPEED* and *VEHICLE GROUPS* to complete this page's test setup (see sections **C** & **D** for complete explanations of these groups or refer to the online Help section). By enabling the *Vary Speeds Within Bins* option, vehicle speeds are varied within the limits of the speed bins during tests; otherwise, vehicle speeds are set to middle of the speed bins. ***Note***: There must be at least 3 KPH between the limits of the speed bin(s) for the speeds to vary. The test speed will be a random value, such that the maximum possible speed tested will be the upper limit minus 1 KPH, and likewise, the minimum possible speed tested will be the lower limit of the speed bin plus 1 KPH. The speed will change after each vehicle has been simulated at the speed.

The lower left hand of the page is a non-editable box that displays the Current Sensor Setup. This is helpful to "double check" that an incorrect setup was not chosen accidentally.

The only thing left to fill in is the *ENTER USER DATA* information. Clicking on this button produces a form (see Figure 5) for the user to fill out so that classifier and user information can be included in the test report. ***Note***: Information entered on this form will be saved to disk for easy reuse. Click on the appropriate drop down arrow to find previously entered data.

Figure 5 Filling out the Classifier Data Form allows the information to be included on the test report

Generate Test

With the test data entered into the User Data form, a test is now ready to be generated. At this point, ensure that the test cables are properly connected to the ATRT and the classifier being tested. To learn more about the cables and their attachment, refer to **Appendix A**. An Interval Test will require synchronized computer and classifier clocks.

Clicking the *GENERATE TEST* button shown above, will bring up Test Display window shown in Figure 6. This display allows three different functions:

- start a test immediately
- set the ATRT to start a test at a specific time
- set an alarm to warn the user to start a test.

Figure 6 Test display prior to the start of a test

The first and simplest function is the *START NOW* option. Clicking this button immediately starts the ATRT to begin the testing procedure. Be sure to have the classifier setup for testing before clicking this button.

The next option, *AUTO START*, gives the user the ability to setup a test and then have it start at a later time. The time shown to the left of the *AUTO START* button is the user-changeable starting time for this option. Clicking the *AUTO START* button once turns the button into an hour glass enabling the feature. Clicking the button again will disable the feature. The reason for an auto start option is to help run tests on classifiers that can only be started at certain times (at the top of the hour, for example). This should help eliminate the need for extensive waiting for classifiers (of this type) to begin recording. **Note**: *ATSI suggests starting 10 seconds after the classifier time to allow for minor differences between the system (computer) clock and the classifier clock.*

The third function is the *WAKE-UP CALL* button. This button brings up a small window (Figure 7) where the alarm clock can be set by entering minutes and seconds then clicking on the alarm clock. The remaining time will count down and generate an alarm once the time reaches zero. It can be paused by clicking on the alarm clock during count down or shut off by clicking on the *CLOSE* button.

Figure 7 Wake-up Call display

Once the test has been started, the Test display window changes as shown in Figure 8. Clicking the *ABORT* button can be used to stop the test at any time. The *ABORT* button often has a slow response, but should always respond within four seconds.

Figure 8 Test display after a test has been started

All pertinent information regarding the current vehicle being simulated by the ATRT is displayed during the test. The bottom status bar (line of information) contains two panels of information, this information is only helpful when getting technical support.

Test Complete

Upon completion of a test, a small window will appear offering three different options as shown in Figure 9. The first option, Auto Compare, is a separate software package that can be purchased to work along with the ATRT-1700 software. Auto Compare offers the user the ability to select an ATRT report and the Classifier report and compare them for discrepancies (see Appendix B for further details). The second option is to view the report in the companion report viewer that was installed with the ATRT-1700 software. The final option is to perform another test. Section IV on page 10 describes the Report Viewer in more detail. ***Note****: The report filename is automatically generated based on the date and the number of tests generated (e.g. Jun_11__Test_02.txt).*

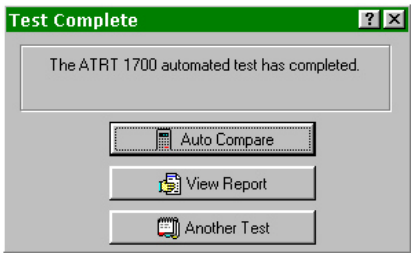


Figure 9 The Test Complete Window

C. SPEED SETUP

As indicated earlier, the remaining page tabs are used to save different test setups, and vehicles for re-use. The Speed Setup page shown in Figure 10 is where new *SPEED GROUPS* and *SPEED BINS* are created and modified if needed.

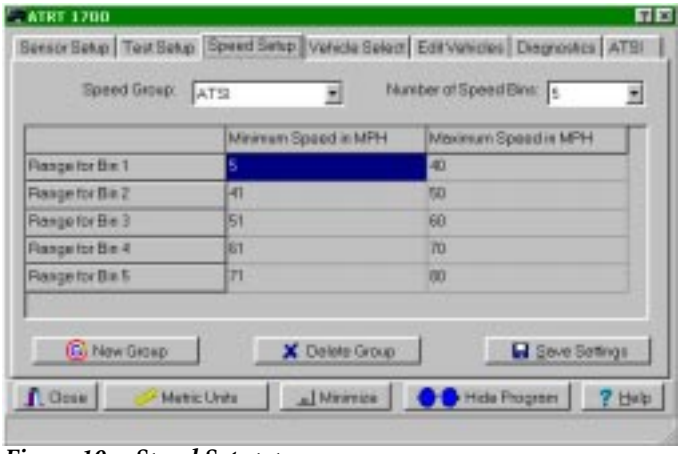


Figure 10 Speed Setup page

A lower and upper bound set the range that the test vehicles' speed must remain within. Each range (or set of limits) is called a speed bin. There may be up to 16 non-overlapping speed bins. The minimum and maximum for each speed bin may be the same number. For example a minimum of 55 and maximum of 55 will ensure that the speed of all simulated vehicles using this speed bin will be 55 MPH (or KPH where appropriate).

A *SPEED GROUP* is the name associated with a set of speed bins. This name is used to determine the speeds at which vehicles are simulated during a test. To enter bin data:

1. First, use the mouse to select the number of bins from the drop down list.
2. Click on the cell (box) in the upper left hand corner of the data entry grid.
3. Enter the minimum value for this bin (e.g. 5) then hit the <TAB> key to automatically advance to the next cell.

4. Enter the maximum value for this bin (e.g. 20) then hit the <TAB> key to automatically advance to the next cell.
5. Continue repeating the above steps until all bins are full.
6. Click the Save Settings button.

To create a new speed group:

1. Click the New Group button and type in the group name and click OK.
2. Continue with the steps described above to enter the bin data.

Remember, the minimum and maximum for each speed bin may be the same number (e.g. 25 MPH to 25 MPH), however, there must be at least 1 MPH (or 1 KPH in metric mode) between one speed bin and the next. If accidental changes were made to any settings and wish to be discarded, select any page tab to bring up the *Discard Entry* warning and click OK.

D. VEHICLE SELECT

The **Vehicle Select** page shown in Figure 11 allows the user to determine which vehicles will be included in the test. A vehicle is selected by left clicking on the desired vehicle designator. The selected vehicles is identified by a check mark to the left of the vehicle designator::vehicle type (e.g. Bus_ATSI::Class 4). To display any cut-off portion, keep the mouse pointer motionless over the desired vehicle, and a help hint will display all of the information.

Figure 11 Vehicle Select page

The *VEHICLE GROUP* is the name associated with a set of specific vehicles. This name is used to determine which vehicles are simulated during a test. The default listing in the Vehicle Group section is the ATSI_Standard group. This group cannot be changed or edited in any way. Also listed in the Vehicle Group's drop down window is User_1 through User_30. To create and save a new group:

1. Choose a User name (e.g. User_1) in the drop down window
2. Select the vehicles to be included in the test
3. Click the *Save Settings* button and then click Yes to the warning prompt
4. Click the *Rename Group* button to give the group a new name
5. Repeat steps 1-4 to create a more groups

NOTE: ATSI Default vehicles contain _ATSI as part of their vehicle designator. They are predefined vehicles that fall within FHWA Vehicle Types. The vehicles were selected because they are within a specific vehicle class and should not contain attributes that could allow classification in more than one type of vehicle. Due to the ambiguous nature of the classification scheme, some classifiers may not agree with the ATSI classification of a vehicle, because the FHWA classifications overlap one another. To correct this mismatch all vehicle classes can be modified (including ATSI standard vehicles). Changing the type of a vehicle to correspond to the classifier's type will ensure the reports match. On the other hand, if the user disagrees with the classifier's categorization, the rules the classifier uses to distinguish different classes must be changed. The manual for the classifier should describe if these rules can be changed and how to change them.

E. EDIT VEHICLES

The FHWA classification schemes are an industry standard, however, many agencies add or make changes to the FHWA classifications to suit their needs. The *EDIT VEHICLE* page shown in Figure 12 is where vehicle changes or additions are made.

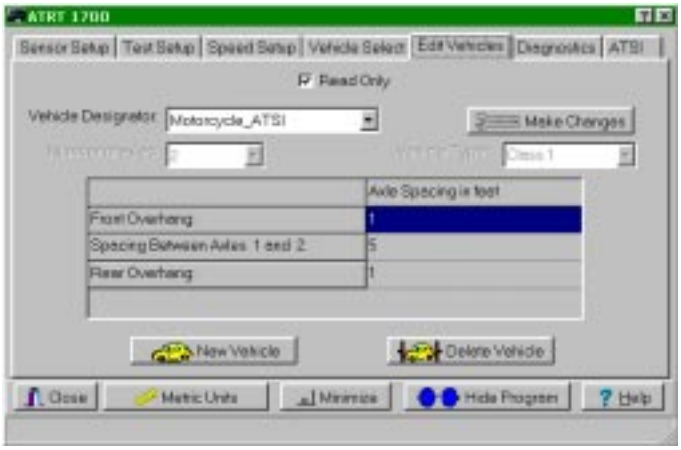


Figure 12 Edit Vehicles page in the Read Only mode

Some classifiers may not agree with the ATSI classification of a vehicle. To correct this mismatch all vehicle classes can be modified (including ATSI standard vehicles). Changing the type of a vehicle to correspond to the classifier's type will ensure the reports will match.

The Edit Vehicle page has two modes:

- Read Only (Vehicle Review) Mode
- Edit Mode/New Vehicle Mode

The Read Only mode allows the user to review a Vehicle and its properties (i.e. Vehicle Type, Number of Axles, and Axle Spacing). If changes need to be made, then the user must switch to the Edit Mode. Access the Edit Mode by either deselecting the *Read Only* option or clicking the *Make Changes* button. When in the Edit Mode, notice the changes to the buttons for New Vehicle and Delete Vehicle as shown in Figure 13. They now display Save Entry and Discard Entry. Changes can now be made to the properties of the vehicle listed.

Note: When the New Vehicle button is pressed and a valid new name is entered, the properties from the previous vehicle remain. This makes it easy for the user to copy vehicles, or create new vehicles that are similar to existing vehicles. However, any and all properties of a New Vehicle may be changed.

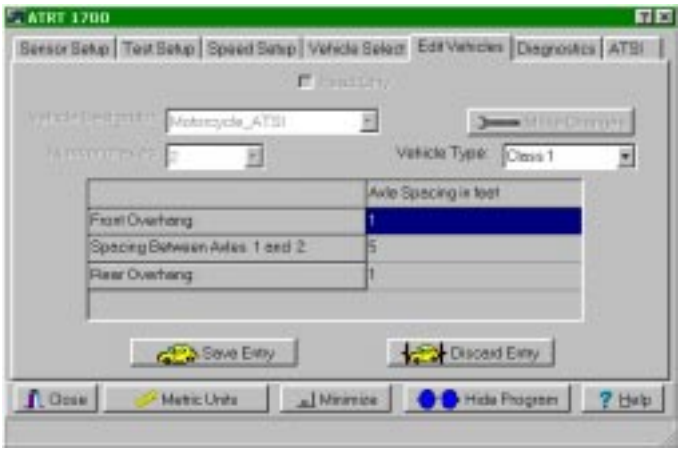


Figure 13 Edit Vehicle page in Edit mode

F. DIAGNOSTICS

If the user wishes to take a look at whether a classifier is recognizing a particular vehicle, they can create a quick test on the *DIAGNOSTIC* page.

One function of the Diagnostic page shown in Figure 14 allows the user to set up a test for an individual vehicle. If needed, the user can go back back to the *SENSOR SETUP* page and modify the setup or they can keep the current setup shown in the upper right corner of the Diagnostics page. The user can also select the *Vehicle Speed* and the *Lane* for the simulated test vehicle. Once the page is setup, click the lightning bolt (*Send Single Vehicle*) to start the single vehicle test.

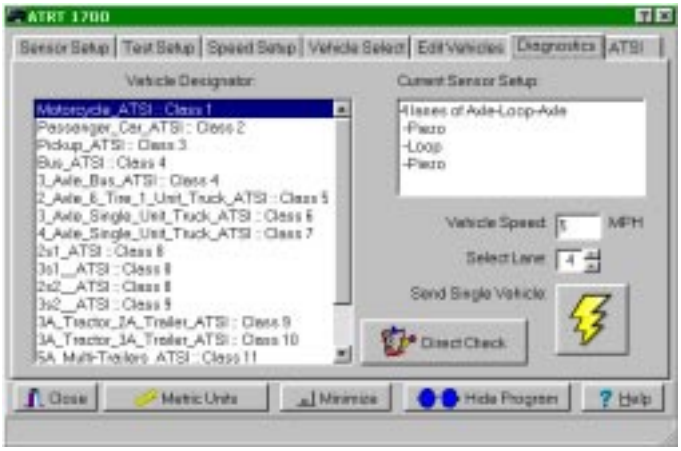


Figure 14 Diagnostics page

The other function of the Diagnostic page is the Direct Check window shown below in Figure 15. Here, the user can individually check each sensors output to verify operation of individual classifier inputs. This can help narrow down hard-to-find existing problems.

To check a sensor, change the setting of a sensor (i.e., click on high for Piezo 1) and click the *Update ATRT* button to simulate a sensor's output.

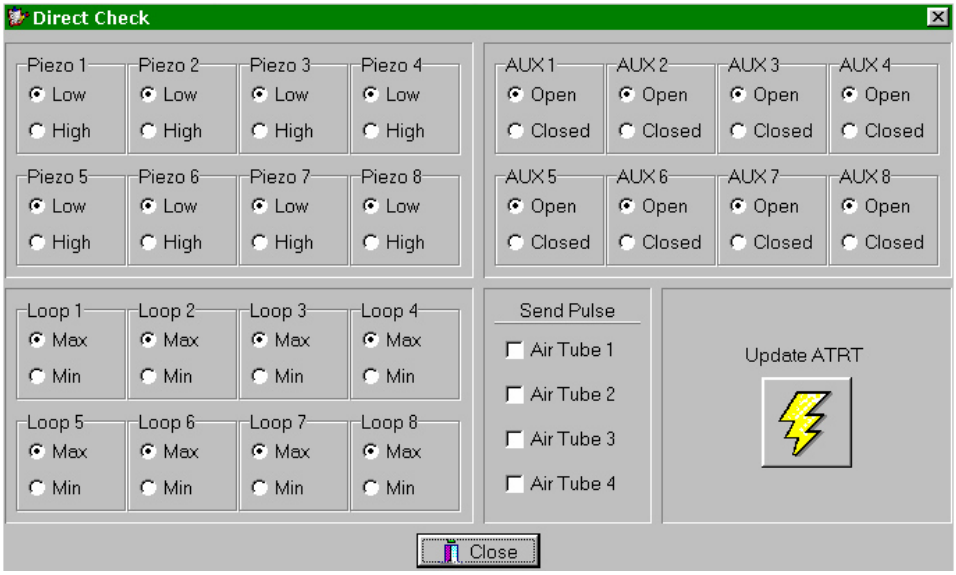


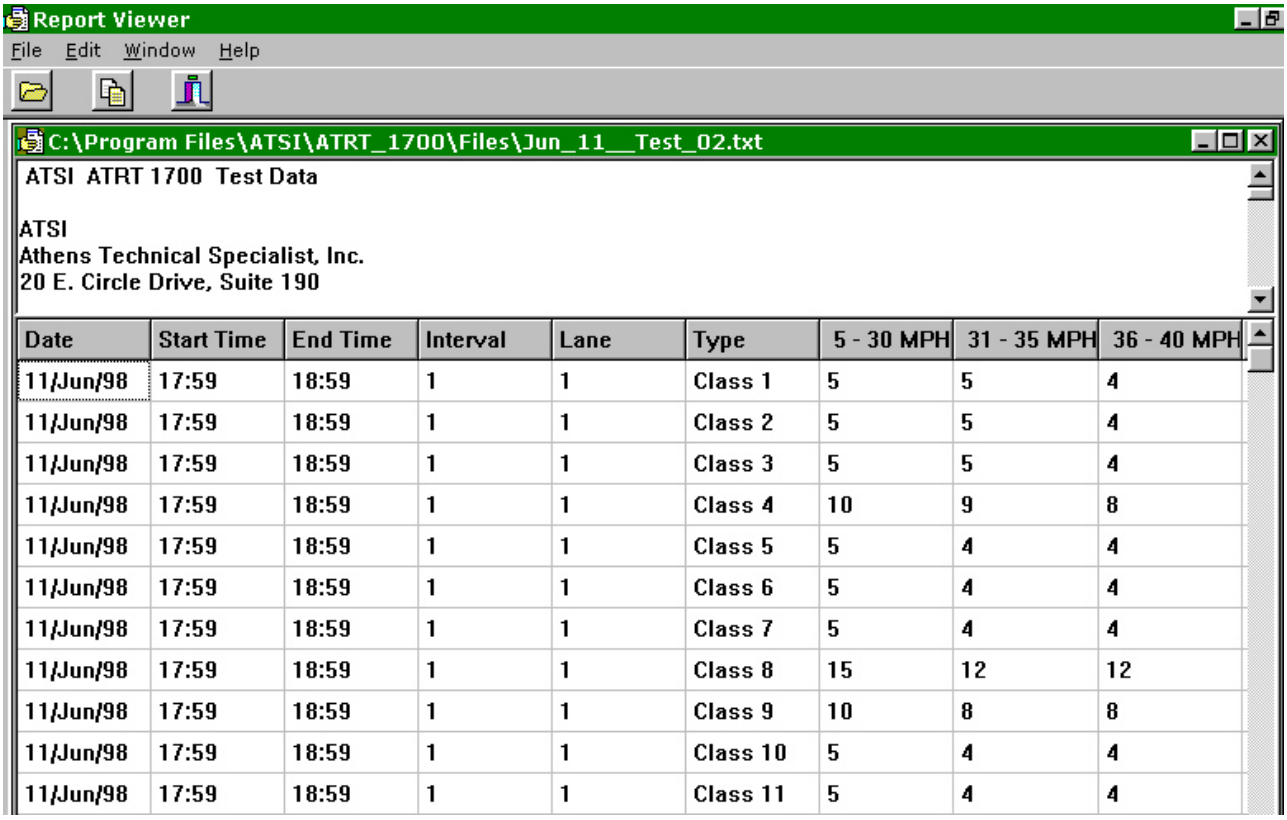
Figure 15 Direct Check view of the Diagnostic page

IV. THE REPORT VIEWER

The Report Viewer is installed automatically with the ATRT-1700 software and allows the user to view the data generated from a completed test. The Report Viewer can be accessed from the Test Complete window as described above and also by clicking the Report Viewer Icon located on the desktop. A sample report is shown below in Figure 16. The Report Viewer is also used to view Auto Compare reports which are described in Appendix B on page 17.

The viewer splits the screen into two different windows: the top for test setup information and the bottom for the test results. Since the window is too small to display all of the speed bins and intervals, use of the scroll bars are necessary to view the remainder of the test results. The columns can be reduced or increased in size and also moved (i.e. click and drag a column that is hidden and move it to an area of the screen to be viewable).

This program is a viewer only, in order to print a test report the user must open the file in a spreadsheet or word processing application of their choice.



Date	Start Time	End Time	Interval	Lane	Type	5 - 30 MPH	31 - 35 MPH	36 - 40 MPH
11/Jun/98	17:59	18:59	1	1	Class 1	5	5	4
11/Jun/98	17:59	18:59	1	1	Class 2	5	5	4
11/Jun/98	17:59	18:59	1	1	Class 3	5	5	4
11/Jun/98	17:59	18:59	1	1	Class 4	10	9	8
11/Jun/98	17:59	18:59	1	1	Class 5	5	4	4
11/Jun/98	17:59	18:59	1	1	Class 6	5	4	4
11/Jun/98	17:59	18:59	1	1	Class 7	5	4	4
11/Jun/98	17:59	18:59	1	1	Class 8	15	12	12
11/Jun/98	17:59	18:59	1	1	Class 9	10	8	8
11/Jun/98	17:59	18:59	1	1	Class 10	5	4	4
11/Jun/98	17:59	18:59	1	1	Class 11	5	4	4

Figure 16 Sample test report viewed in the companion Report Viewer

V. STEP-BY-STEP SETUP EXAMPLES

Prior to actual test setups, be sure to have all cables attached to the ATRT and have the classifier prepared to test.

EXAMPLE #1

The following is a scenario of a user who has a classifier to be tested with the ATRT-1700. The classifier's setup is axle-loop-axle with a loop length of 6 feet and distances of 5 and 11 feet between the sensors as shown below is Figure 17. Sensors used are piezos and loops on a 4 lane highway.

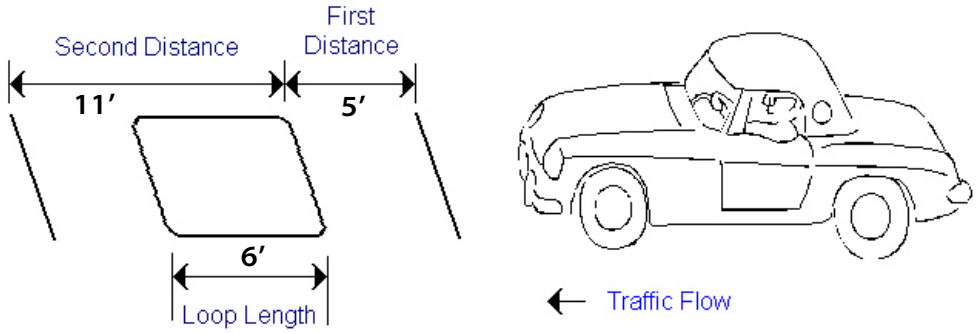


Figure 17 Sensor Setup example

A step by step procedure shown over the next few pages will guide the user through a typical setup for the above stated example.

STEP 1. SENSOR SETUP PAGE

1) Choose the sensor arrangement to match the field setup. In this case it would be Axle-Loop-Axle
2) Select the sensor type, Piezo-Loop-Piezo. Notice that when sensor 1 was selected, sensor 3 was automatically filled-in to match the first sensor.
3) Fill in the distances between the sensors. The first distance is measured from the leading edge of the first sensor that the traffic will encounter to the leading edge of the second sensor that the traffic will encounter (5'). The second distance is measured from the leading edge of the second sensor that the traffic will encounter to the leading edge of the third sensor that the traffic will encounter (11'). The loop length is measured from one end of the loop to the other. (See Figure 17 above)
4) Choose the Number of Lanes as 4.
5) Choose the Loop Length as 6 feet.
6) ***OPTIONAL***: Click Save and give the setup a filename so it can be used again at a later time.

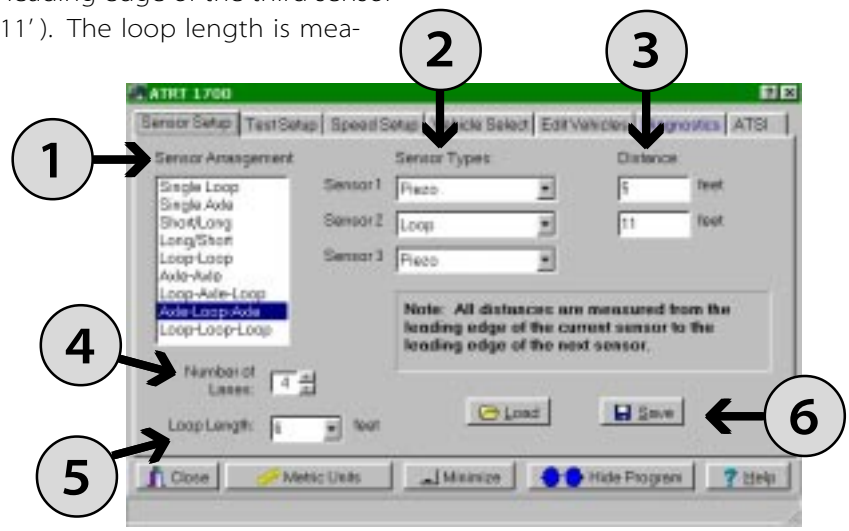


Figure 18 Steps to set up the Sensor Setup page of Example #1

STEP 2. TEST SETUP PAGE

1) Click the Interval Test radio button to select this test type.
2) Type in 12 for the Number of Intervals.
3) Select 30 minutes from the drop-down menu for the Interval Period.
4) Select 1 second from the drop-down menu for the Minimum Time Between Vehicles.
5) Select ATSI from the drop-down menu for the Speed Group for Test.
6) Select ATSI_Standard from the drop-down menu for the Vehicle Group for Test.
7) Now click the Enter User Data to bring up the User Data window and fill it in as shown below in Figure 19.
8) Finally, click the Generate Test button to bring up the Test window shown in Figure 20 in Step 3.

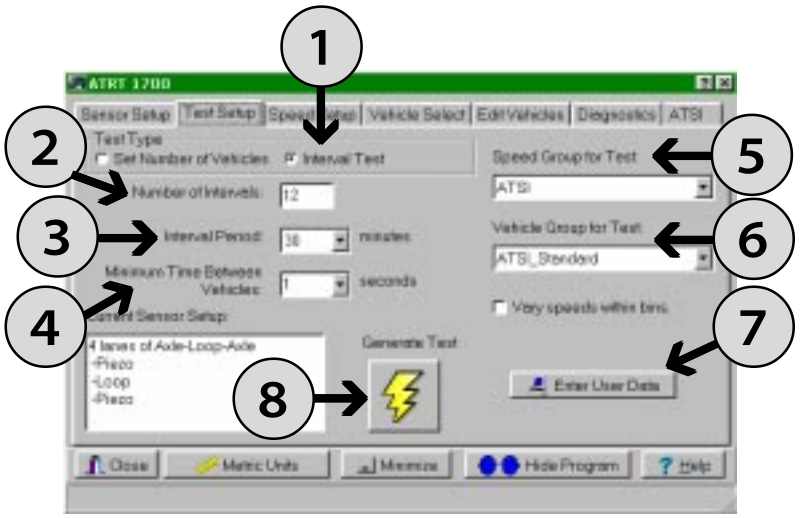


Figure 18 Steps to set up the Test Setup page of Example #1

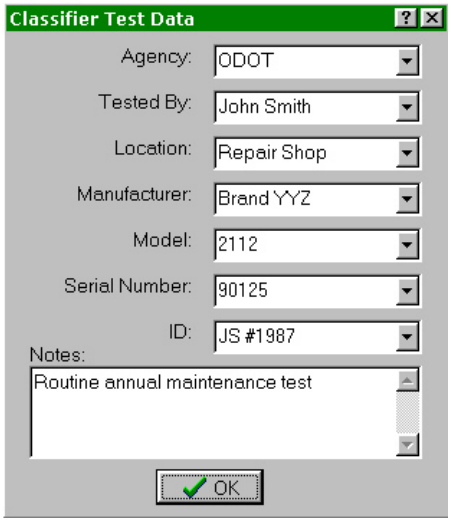


Figure 19 Example #1 User Data

Note: *The ATSI Speed and ATSI_Standard Vehicle groups were chosen for example purposes only. Typically, the user will create their own groups to perform tests with.*

STEP 3. TEST PAGE

For this example, the Auto Start option will be chosen to start the test.

1) Type in 15:30:10 for the starting time.
2) Click the Auto Start button.
3) **Optional**. Click the Minimize button to send the program to the taskbar or click the Hide Program button to send it to the system tray.

Note: *There is a 25 second break between intervals. ATSI suggests starting 10 seconds after the classifier time to allow for minor differences between the system (computer) clock and the classifier clock.*

The 6 hour long test is now in progress.

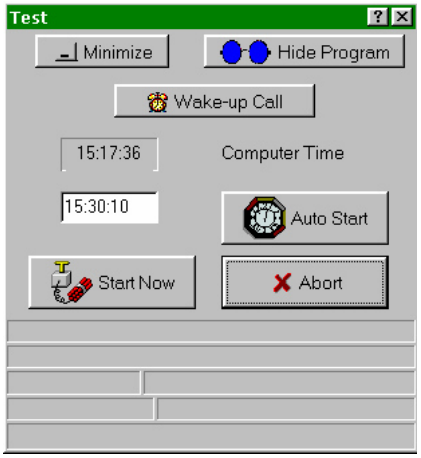


Figure 20 Example #1 Test window

EXAMPLE #2

This example has the exact same scenario as described in Example #1 on page 11. The only difference is that the technician is an experienced user of the ATRT-1700. They have performed many tests and saved the sensor setups (*Example #1.sen for this example*) to be able to quickly reload them for a future test situation. This example shows the use of the load feature and the time it saves.

STEP 1. SENSOR SETUP PAGE

1) Click the Load button to bring up the Open window shown in figure 21.
2) Select Example #1.sen and click the Open button. This loads the Sensor Setup page with the values that were saved from a previous setup.

Continue the setup by repeating steps 2 and 3 as shown in Example #1.

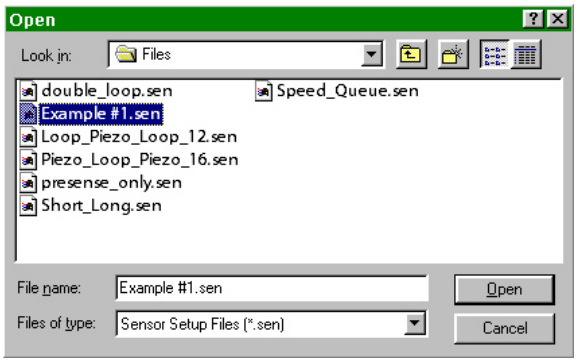


Figure 21 Open window allows the user to choose the file to load

APPENDIX A. CABLE PINOUTS

The ATRT-1700 is shipped with the connectors for the user to make the cables required for the different sensors and classifiers that are available. The user can have the cables made and shipped to them if desired. Contact ATSI for pricing and arrangements for this service.

Below are cable pinouts for 3 common classifiers. If the classifier you use is not listed, contact ATSI with the manufacturer and model of your classifier for the pinouts.

	ATRT-1700	PEEK ADR Cable (P/N: 81-303 rev. 0198)
PIEZO CABLE	(1) PIEZO 1	1 RED - CABLE 1
	(2) PIEZO 2	2 WHITE - CABLE 1
	(3) COMMON	1 BLACK, 2 BLACK - CABLE 1
	(4) PIEZO 3	3 GREEN - CABLE 1
	(5) PIEZO 4	4 BLUE - CABLE 1
	(6) COMMON	3 BLACK, 4 BLACK - CABLE 1
	(7) PIEZO 5	1 RED - CABLE 2
	(8) PIEZO 6	2 WHITE - CABLE 2
	(9) COMMON	1 BLACK, 2 BLACK - CABLE 2
	(10)PIEZO 7	3 GREEN - CABLE 2
	(11)PIEZO 8	4 BLUE - CABLE 2
	(12)COMMON	3 BLACK, 4 BLACK - CABLE 2
AUX CABLE	(1) AUX 1	1 RED - CABLE 1
	(2) COMMON	NC
	(3) AUX 2	1 BLACK - CABLE 1
	(4) COMMON	NC
	(5) AUX 3	2 WHITE - CABLE 1
	(6) COMMON	NC
	(7) AUX 4	2 BLACK - CABLE 1
	(8) AUX 5	3 GREEN - CABLE 1
	(9) COMMON	NC
	(10)AUX 6	3 BLACK- CABLE 1
	(11)COMMON	4 BLACK - CABLE 1
	(12)AUX 7	4 BLUE - CABLE 1
	(13)COMMON	4 BLACK - CABLE 2
	(14)AUX 8	1 RED - CABLE 2
LOOP CABLE	(1) LOOP 1	1 RED - CABLE 1
	(2) LOOP 1	1 BLACK - CABLE 1
	(3) LOOP 2	2 WHITE - CABLE 1
	(4) LOOP 2	2 BLACK - CABLE 1
	(5) LOOP 3	3 GREEN - CABLE 1
	(6) LOOP 3	3 BLACK - CABLE 1
	(7) LOOP 4	4 BLUE - CABLE 1
	(8) LOOP 4	4 BLACK - CABLE 1
	(9) LOOP 5	1 RED - CABLE 2
	(10)LOOP 5	1 BLACK - CABLE 2
	(11)LOOP 6	2 WHITE - CABLE 2
	(12)LOOP 6	2 BLACK - CABLE 2
	(13)LOOP 7	3 GREEN - CABLE 2
	(14)LOOP 7	3 BLACK - CABLE 2
	(15)LOOP 8	4 BLUE - CABLE 2
	(16)LOOP 8	4 BLACK - CABLE 2

PIEZO CABLE

ATRT-1700	PEEK 241 Cable (P/N: 0205901)
(1) PIEZO 1	1 RED - CABLE 1
(2) PIEZO 2	2 WHITE - CABLE 1
(3) COMMON	1 BLACK, 2 BLACK - CABLE 1
(4) PIEZO 3	3 GREEN - CABLE 1
(5) PIEZO 4	4 BLUE - CABLE 1
(6) COMMON	3 BLACK, 4 BLACK - CABLE 1
(7) PIEZO 5	1 RED - CABLE 2
(8) PIEZO 6	2 WHITE - CABLE 2
(9) COMMON	1 BLACK, 2 BLACK - CABLE 2
(10)PIEZO 7	3 GREEN - CABLE 2
(11)PIEZO 8	4 BLUE - CABLE 2
(12)COMMON	3 BLACK, 4 BLACK - CABLE 2

AUX CABLE

	PEEK 241 Cable (P/N: 0205918)
(1) AUX 1	BROWN
(2) COMMON	NC
(3) AUX 2	RED
(4) COMMON	NC
(5) AUX 3	ORANGE
(6) COMMON	NC
(7) AUX 4	YELLOW
(8) AUX 5	GREEN
(9) COMMON	NC
(10)AUX 6	BLUE
(11)COMMON	NC
(12)AUX 7	VIOLET
(13)COMMON	BLACK
(14)AUX 8	GREY

LOOP CABLE

	PEEK 241 Cable (P/N: 0205866)
(1) LOOP 1	1 RED - CABLE 1
(2) LOOP 1	1 BLACK - CABLE 1
(3) LOOP 2	2 WHITE - CABLE 1
(4) LOOP 2	2 BLACK - CABLE 1
(5) LOOP 3	3 GREEN - CABLE 1
(6) LOOP 3	3 BLACK - CABLE 1
(7) LOOP 4	4 BLUE - CABLE 1
(8) LOOP 4	4 BLACK - CABLE 1
(9) LOOP 5	1 RED - CABLE 2
(10)LOOP 5	1 BLACK - CABLE 2
(11)LOOP 6	2 WHITE - CABLE 2
(12)LOOP 6	2 BLACK - CABLE 2
(13)LOOP 7	3 GREEN - CABLE 2
(14)LOOP 7	3 BLACK - CABLE 2
(15)LOOP 8	4 BLUE - CABLE 2
(16)LOOP 8	4 BLACK - CABLE 2

PIEZO CABLE

ATRT-1700	DIAMOND Cables 4 Input Piezo Electric Harness
(1) PIEZO 1	1 RED - CABLE 1
(2) PIEZO 2	2 WHITE - CABLE 1
(3) COMMON	1 BLACK, 2 BLACK - CABLE 1
(4) PIEZO 3	3 GREEN - CABLE 1
(5) PIEZO 4	4 BLUE - CABLE 1
(6) COMMON	3 BLACK, 4 BLACK - CABLE 1
(7) PIEZO 5	1 RED - CABLE 2
(8) PIEZO 6	2 WHITE - CABLE 2
(9) COMMON	1 BLACK, 2 BLACK - CABLE 2
(10)PIEZO 7	3 GREEN - CABLE 2
(11)PIEZO 8	4 BLUE - CABLE 2
(12)COMMON	3 BLACK, 4 BLACK - CABLE 2

AUX CABLE

	DIAMOND Cables 4 Input Resistive Harness
(1) AUX 1	1 RED - CABLE 1
(2) COMMON	1 BLACK - CABLE 1
(3) AUX 2	2 WHITE - CABLE 1
(4) COMMON	2 BLACK - CABLE 1
(5) AUX 3	3 GREEN - CABLE 1
(6) COMMON	3 BLACK, 4 BLACK - CABLE 1
(7) AUX 4	4 BLUE - CABLE 1
(8) AUX 5	1 RED - CABLE 2
(9) COMMON	1 BLACK, 2 BLACK - CABLE 2
(10)AUX 6	2 WHITE - CABLE 2
(11)COMMON	3 BLACK - CABLE 2
(12)AUX 7	3 GREEN - CABLE 2
(13)COMMON	4 BLACK - CABLE 2
(14)AUX 8	4 BLUE - CABLE 2

LOOP CABLE

	DIAMOND Cables 4 Input External Loop Harness
(1) LOOP 1	1 GREEN - CABLE 1
(2) LOOP 1	1 BLACK - CABLE 1
(3) LOOP 2	2 WHITE - CABLE 1
(4) LOOP 2	2 BLACK - CABLE 1
(5) LOOP 3	3 RED - CABLE 1
(6) LOOP 3	3 BLACK - CABLE 1
(7) LOOP 4	4 BLUE - CABLE 1
(8) LOOP 4	4 BLACK - CABLE 1
(9) LOOP 5	1 GREEN - CABLE 2
(10)LOOP 5	1 BLACK - CABLE 2
(11)LOOP 6	2 WHITE - CABLE 2
(12)LOOP 6	2 BLACK - CABLE 2
(13)LOOP 7	3 RED - CABLE 2
(14)LOOP 7	3 BLACK - CABLE 2
(15)LOOP 8	4 BLUE - CABLE 2
(16)LOOP 8	4 BLACK - CABLE 2

APPENDIX B. AUTO COMPARE SOFTWARE

The Auto Compare software is a valuable tool to quickly compare an ATRT-1700 test report with the classifier report and generate a comparison report.

Figure 22 shows the opening screen of the Auto Compare software. The top half of the window displays fields for typing the filenames of the reports to be compared. Both fields also have an associated *BROWSE* option to allow the user to view the folder which holds test reports.

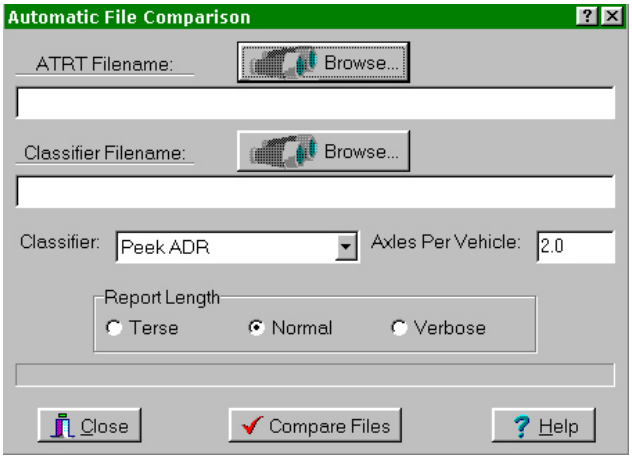


Figure 22 Opening screen of the Auto Compare software

The *CLASSIFIER* field located in the bottom half of the window must be selected to match the Classifier. (i.e. if the Classifier File is a Peek ADR report, the Classifier field must indicate Peek ADR). If they do not match and the Compare Files button is clicked, an error will pop up as shown in Figure 23.

Figure 23 An invalid report error

The *AXLES PER VEHICLE* field is used if the classifier was set up to estimate the number of vehicles by a ratio of axle hits; the ratio used by the classifier must be entered here. If a "count only" type of classifier report is detected by the ATRT, then the form shown in Figure 24 will appear. If loops were used as vehicle detectors then the classifier used an actual vehicle count. However, if axle detectors were used, then a ratio of axle hits is typically used, and the axles per vehicle ratio is used in the comparison. ***Note****: some classifiers have an advanced feature that allows actual vehicle counts using only axle sensor(s), for a correct assessment, the same type of report generated by the classifier must be indicated here.*

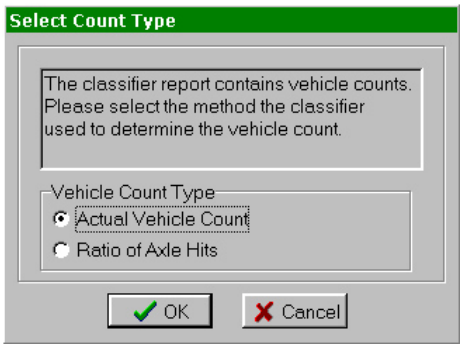


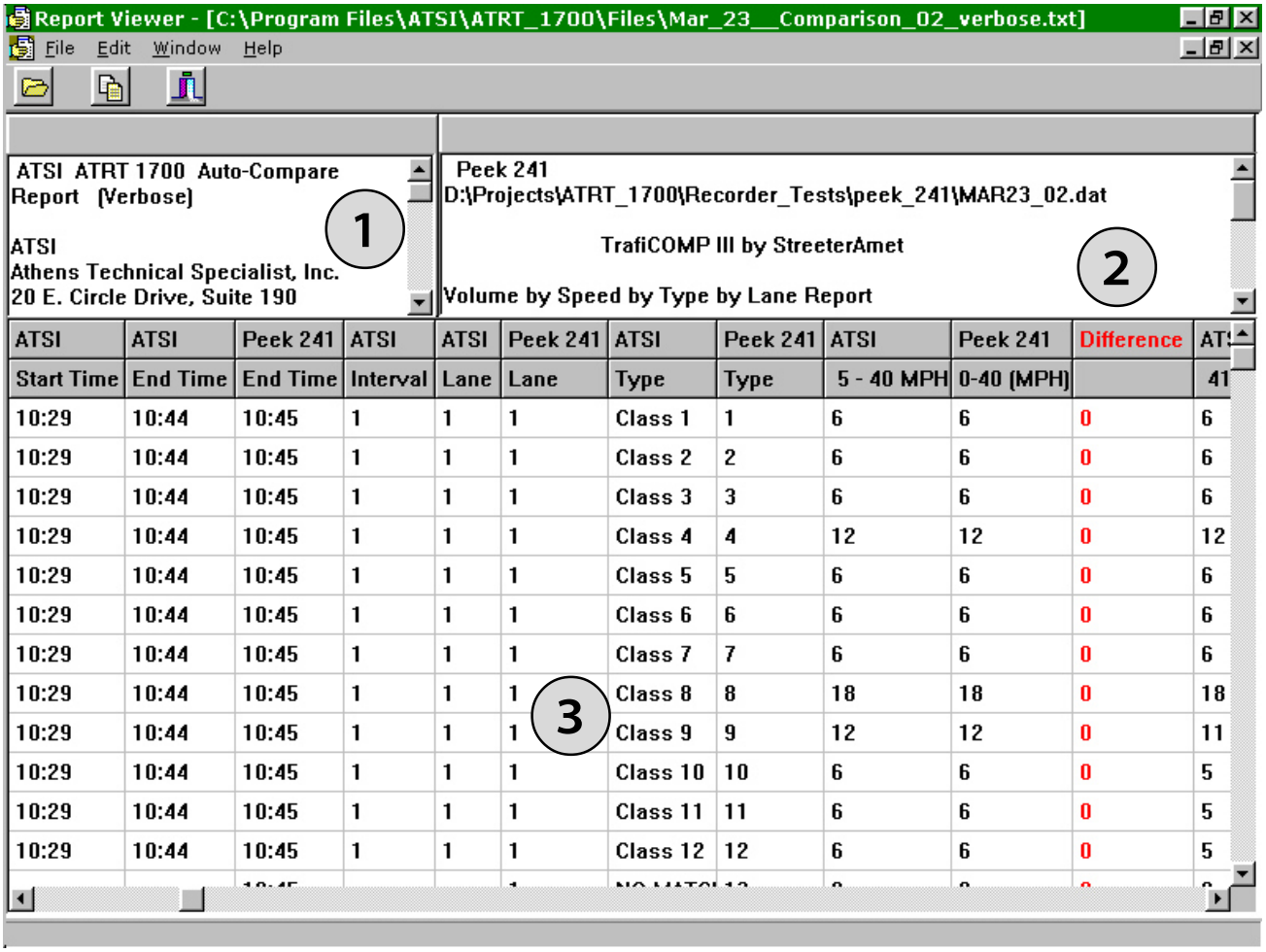
Figure 24 This window appears if the ATRT-1700 detects a "Count Only" classifier report.

The *REPORT LENGTH* option offers the user a choice of how the results of the comparison test are shown on the report. The *TERSE* option makes it easy to find problem areas by only showing data containing differences. The NORMAL report shows more information than the terse report; if any row contains a discrepancy, then that entire row is included in the report. For a complete report, choose the *VERBOSE* report option where all information generated in a test is shown in the report. A *VERBOSE* report may be used when complete printed documentation of testing is required.

AN AUTO COMPARE REPORT

An Auto Compare report consists of three sections as shown below in Figure 25 and can be viewed with the Report Viewer as described on page 10. The first section provides information from the ATRT-1700 test report. The information is based upon the Sensor and Test Setup pages of the ATRT-1700 software. The second section displays information from the report generated by the classifier. The information displayed depends upon the classifier with some classifiers providing more information than others.

The last section is the comparison report. As shown in the example below, the report consists of columns of ATSI information and classifier information (e.g. ATSI 5-40 MPH & Peek 241 0-40 MPH). The column next to these is the *DIFFERENCE* column which is displayed in red text to make it easy to quickly look down the column to see if there are any discrepancies listed.



ATSI Start Time	ATSI End Time	Peek 241 End Time	ATSI Interval	ATSI Lane	Peek 241 Lane	ATSI Type	Peek 241 Type	ATSI 5 - 40 MPH	Peek 241 0-40 (MPH)	Difference	ATS 41
10:29	10:44	10:45	1	1	1	Class 1	1	6	6	0	6
10:29	10:44	10:45	1	1	1	Class 2	2	6	6	0	6
10:29	10:44	10:45	1	1	1	Class 3	3	6	6	0	6
10:29	10:44	10:45	1	1	1	Class 4	4	12	12	0	12
10:29	10:44	10:45	1	1	1	Class 5	5	6	6	0	6
10:29	10:44	10:45	1	1	1	Class 6	6	6	6	0	6
10:29	10:44	10:45	1	1	1	Class 7	7	6	6	0	6
10:29	10:44	10:45	1	1	1	Class 8	8	18	18	0	18
10:29	10:44	10:45	1	1	1	Class 9	9	12	12	0	11
10:29	10:44	10:45	1	1	1	Class 10	10	6	6	0	5
10:29	10:44	10:45	1	1	1	Class 11	11	6	6	0	5
10:29	10:44	10:45	1	1	1	Class 12	12	6	6	0	5

Figure 25 The different windows of an Auto Compare report